



Status of Terra Mission

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MODIS/VIIRS Science Team Meeting
May, 2023

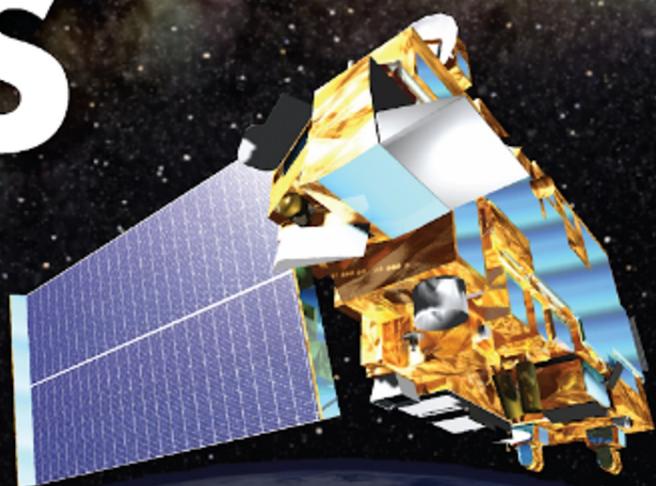
TERRA



23 YEARS

5 INSTRUMENTS
ASTER • CERES • MISR
MODIS • MOPITT

**OVER
100,000
ORBITS**



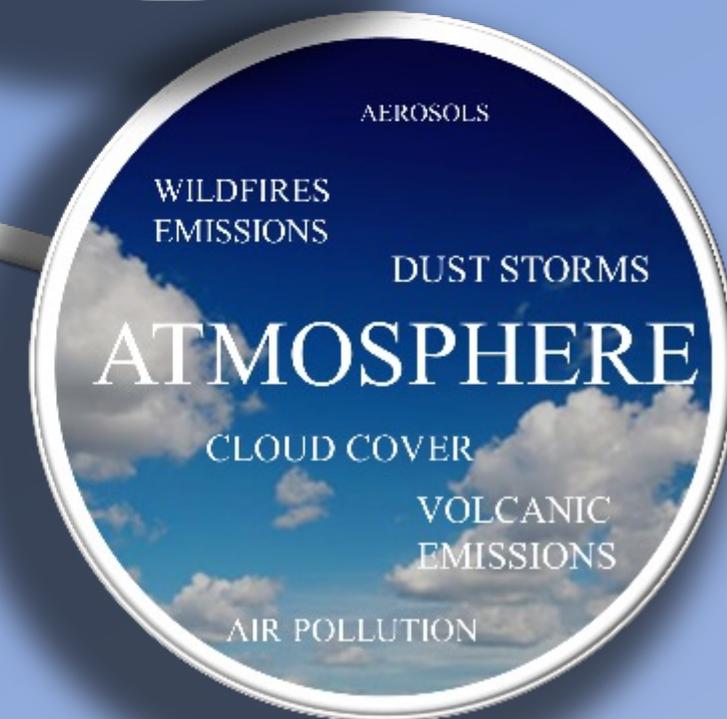
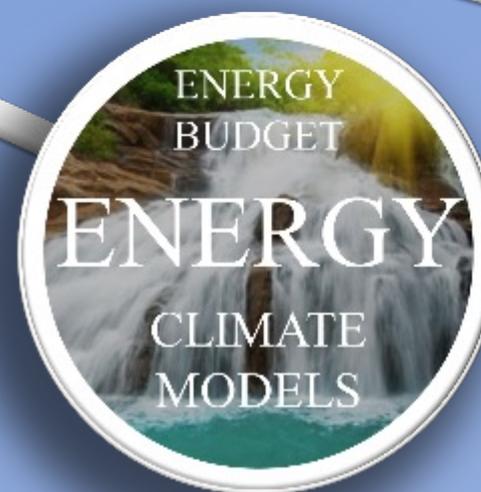
20,000 PUBLICATIONS
350,000 CITATIONS

**4.6
MILLION
USERS**

**83 DATA
PRODUCTS**



SCIENCE AREAS USING TERRA DATA



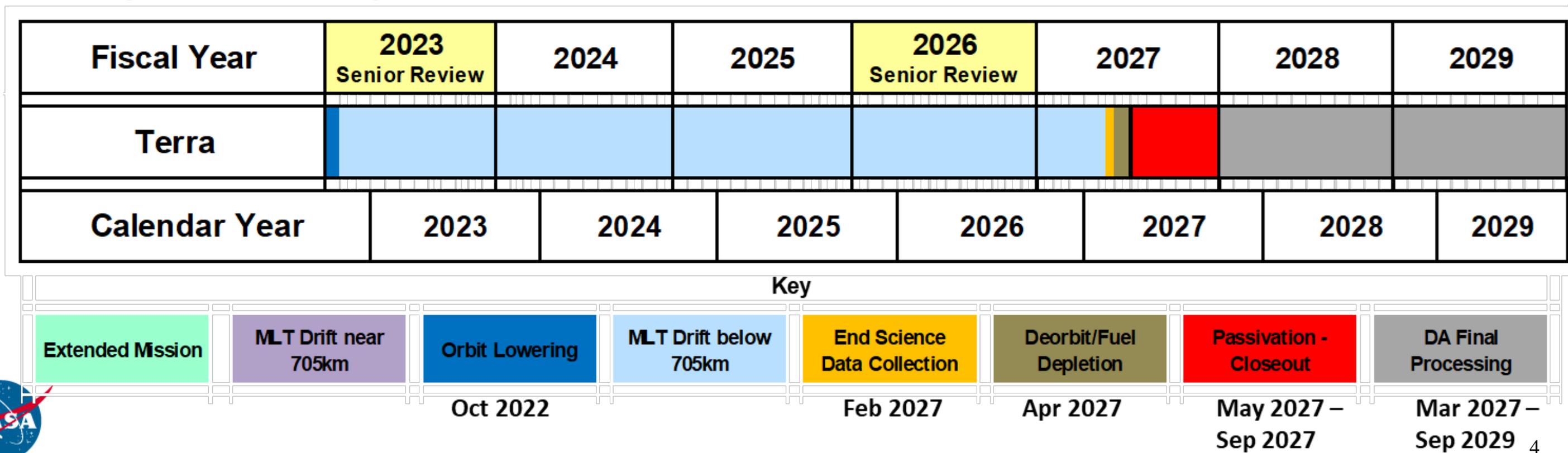
For 23 years, the Terra mission has continually collected scientific data dedicated to understanding Earth's systems

The size of the circles on the right represent the relative number of the 83 data products from Terra data in each science area

Terra is a healthy platform

No known life-limiting hardware on Terra at this time

- **Last inclination burns** took place in **March 2020** and crossing time changing to earlier times reaching 10:15 am in Sept. 2022
- Terra **exited 705-km constellation** in **Oct. 2022**
- Terra continues to drift in crossing time with altitude slowly decaying and **end of science in Feb. 2027**
- Perigee lowering and spacecraft **passivation in Sept. 2027**



2023 Senior Review

Senior Review requested a proposal with Terra operations through 2026

- Extended budget is 50% of what has been used in the past to operate mission
 - Budgets assume Terra science collection ends in February 2027
 - Operations budget leads to lights out periods overnight
 - Science budget leads to reduced response to sensor changes
- Algorithm maintenance support is again integrated into the project proposals



TERRA

The Flagship Earth Observing Satellite

2023

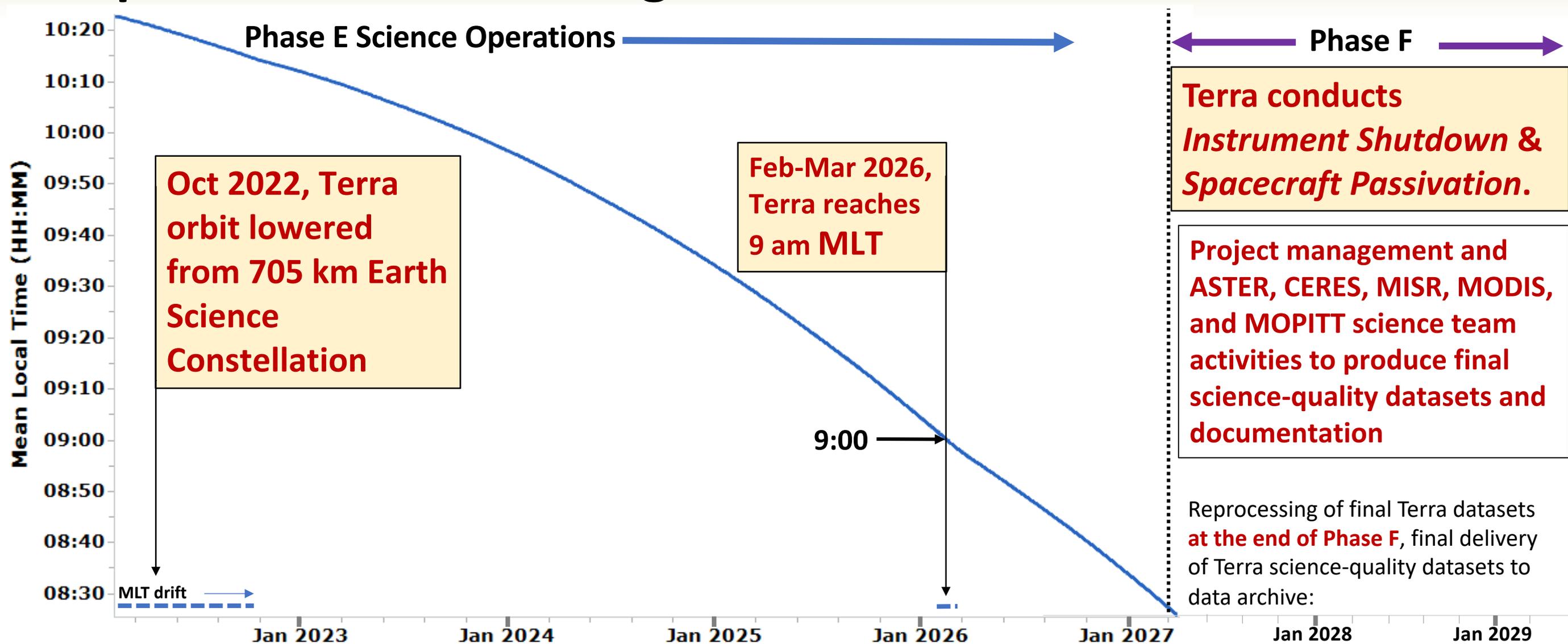
National Aeronautics and
Space Administration



Proposal
Senior Review 2023
of the Mission Operations and Data Analysis
Program for the Earth Science Operating Missions



Terra Operations and crossing time



- Risk mitigation maneuvers for orbital debris avoidance continue until passivation
- Inclination adjust maneuvers ended in Spring 2020 (crossing time not maintained)
- Drag makeup maneuvers no longer occur to maintain Terra's altitude
- WRS-2 (worldwide reference system) and 16-day repeat ground track not maintained



Terra continues to add to its 23-year legacy

Met the 18-year, planned data record for **three** EOS AM platforms

- Terra continues to play a role as baseline for comparisons for recent and future missions such as S-NPP, NOAA-20, Earth Venture, ESO
- Successful Senior Review Proposal provides the opportunity for >3 years of additional data
 - Quality of Terra data will be maintained
 - Lights out operations and reduced science budgets may lead to delays in when that quality is achieved

“A well-built spacecraft, talented people running it and making great science products, with lots of people using the data, that’s what has kept it running all these years.”

Dimitrios Mantziaras, Terra Mission Director marking Terra’s 100,000 orbits



NASA scientists, engineers and designers pose in front of a full-sized model of Terra



Terra team/sensors

- GSFC
 - Project Scientist (PS) Kurt Thome
 - Deputy PS Si-Chee Tsay
 - Deputy PS for Data Robert Wolfe
 - ESMO Project Manager Wynn Watson
- Instrument PIs and Team Leads (TL)
 - ASTER Japan TL Yasushi Yamaguchi
 - US TL Michael Abrams (UJPL)
 - CERES PI Norman Loeb (LaRC)
 - MISR PI David Diner (JPL)
 - MODIS TL Miguel Román (Leidos)
 - MOPITT Canada PI James Drummond (Dalhousie Univ.)
 - US PI Helen Worden (NCAR)



Terra (EOS AM-1)

- ASTER
 - Hi-resolution, multi-spectral images from 15 m to 90 m resolution, plus stereo
- CERES
 - Earth's shortwave, longwave, and net radiant energy budget
- MISR
 - Global multiangle images for aerosol, cloud, and surface characteristics
- MODIS
 - 1-2 day global coverage in 36 wavelengths from 250 m to 1 km resolution
- MOPITT
 - Global measures of CO

